Advanced Water Systems – Altela, Inc.

Second Meeting of the Science, Technology and Telecommunications Committee

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Altela, Inc.

Treating Water Naturally

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Produced Water

- About 60 million years old
- 2 to 3 miles below the surface of the ground
- Very brackish; often 2 to 3 times more salty than ocean water
- Mixed contaminant; 'highly-challenged' water; contains all of:
  - Many different kinds of salt (not just one, like ocean)
  - Residual oils, condensate, BTEX, etc.
  - Metallics, inorganics, etc.
  - Sometimes radionucleotides

Produced Water

- Nearly 100% is disposed of through re-injection wells
- Disposal cost is the sum of:
  - Truck transportation cost and
  - Disposal well cost (amortization and operation)
- Disposal costs in NM range from $0.17/bbl to $6.00/bbl ($0.15/gal)
- Treating this water on-site saves money, highways, extends well life-times, etc.
- Note that O&G producers paid to lift this water thousands of feet
- “Economic Value” (importance) of this PW is $86,000/acre-foot ($100/bbl of oil X 1 bbl oil/9 bbl PW X 7,760 bbl/AF)

Economics of Water

Water Use	$/gal	$/1,000 gal	$/bbl	$/acre-foot	X times Municipal
Irrigation water	$0.00008	$0.08	$0.003	$25	0.025 X
Irrigation water	$0.0008	$0.80	$0.03	$250	0.25 X
Municipal water	$0.003	$3.00	$0.13	$1,000	1.0 X
Low TDS water	$0.006	$6.00	$0.26	$2,000	2.0 X
'Deep Water'	$0.012	$12.00	$0.50	$4,000	4.0 X
'Produced Water'	$0.12	$120.00	$5.00	$40,000	40 X
High Cost Water	$0.60	$600.00	$25.00	$194,000	194 X
"Oil Equivalent"	$1.90	$1,900	$80.00	$621,000	620 X
Bottled water	$8.00	$8,000	$336.00	$2,608,000	2,608 X

Legal & Regulatory

Produced Water Transition Under-way:

- No longer being treated as solely a problem of waste disposal but instead is increasingly being treated as an asset
- More Water, More Energy, Less Waste Act of 2007 (Expanding Usable Water through Re-Use of PW)
- BLM, USGS, BOR partner to recover and clean produced water to increase supplies of usable water
- U.S. EPA CBM Task Force Reviewing Federal Regs

NM statutes and case-law offer support that wastewater (PW) from oil and gas production treated as:

- Part of real property mineral estate
- Owned by the landowner
- Conveyed to producer via oil and gas lease
- Transferable by the producer as personal property
- Subject to state and federal laws & regulations


ALTELA

Treating water naturally – turning a liability into an asset:

What is Altela's Uniqueness?

Altela represents a simple, elegant, inexpensive, new form of water desalination products:

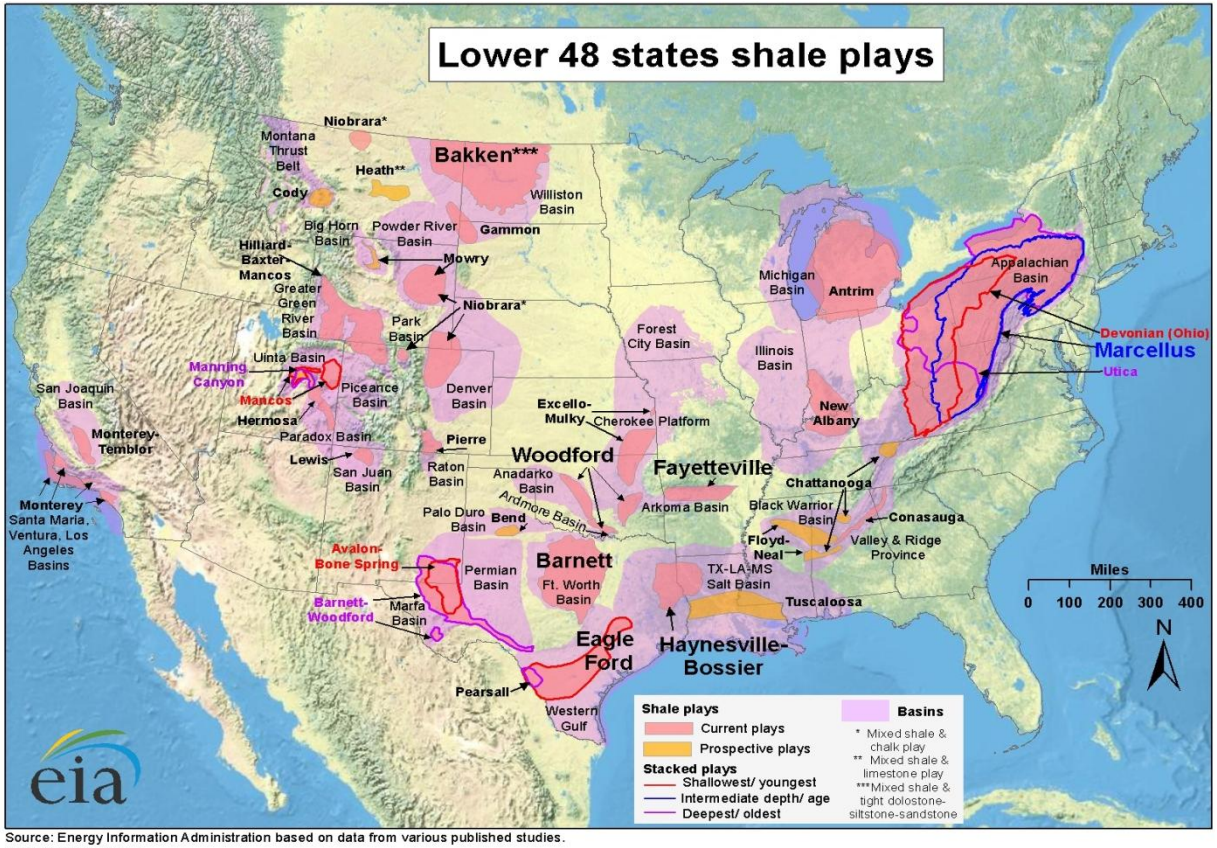
- World's only economic desal that does not use pressure
- So, no pressure vessel is required
- Which must be constructed of metal to withstand the pressure
- For which the metal corrodes in the presence of produced water
- For which high CapEx, high-alloy metals are required to extend lifetime of pressure vessels, pumps, valves, pipes, etc.
- And for which high OpEx costs are required because pressure requires pressure pumps, which require expensive electricity

What is the demand for Shale water?

Altela has the ability and capacity to address all Shale water demands including treatment, re-use, and and certified frac-water sales:

- Re-use
- Recycle
- Storage
- Disposal
- Environmental

North American Shale Gas Plays



Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

Two New Altela Frac Water Treatment Plants

CARES – www.CARESforWATER.com

- Joint venture between Altela, Inc. and Casella Waste Systems, Inc.
- Located in McKean County, PA
- 10,000 bbls/day capacity

CAES – www.CAESwater.com

- Joint venture between Altela, Inc. and ACI Energy, Inc.
- Located in Clarion County, PA
- 10,000 bbls/day capacity

CARES

CAES

What these Plants Can Do

- Offer both the (i) most flexible 'one-stop shop' of complete E&P services and (ii) the lowest-cost sustainable extraction of clean distilled water from any wastewater.
- The Altela water treatment technology is economical, reliable and has proven to meet stringent water quality requirements (including PA DEP and DOE).
- Provide separation and solidification services, interim water storage, centralized transportation network of rail and over-the-road trucking, and storage areas for lay-down yards.
- Reproducible distilled water and certified recycled frac water ensures that frac chemistry is the same for each new frac, for each customer's exact specification.
- Recycled frac water can be supplied with any level of customer-defined limits of removal of TSS, iron, barium, calcium, chlorides, TDS, sulfates, friction reducers, surfactants, biocides, radionuclides, etc.

Altela, Inc. Overview

- Incorporated in 2005 specifically to solve E&P water treatment and disposal problems in a fundamentally new way
- Developed the world's only economical desalination process to treat highly-challenged mixed-contaminant water that does NOT use pressure to drive the desal process, yet still recaptures the heat of condensation 3 times over to make 3 barrels of clean distilled water for the same energy that normally would make only 1 barrel – by treating water naturally
- Unlike all its competitors, the Altela desal process is NOT an 'evaporator' – and is NOT driven by pressure pumps and electricity like MVC – and is NOT a membrane process like RO
- Constructed with inexpensive plastics that do not corrode, foul, or scale
- Strong national and international IP protection
- Precedent-setting permitting, environmental, regulatory expertise
- Financially backed by $11 billion E&P private equity firm

Altela, Inc. Towers and Chase

Mother Nature's Water Desalination Process

Rain water comes from unpotable water – the oceans:

- Step 1: Passive solar energy *evaporates* water at the ocean surface
- Using low-grade heat and no pressure
- This clean water vapor is later released as rain in:
- Step 2: Cold air cannot hold as much moisture as hot air
- So rising air gets colder, causing *condensation* – rain
- And the amount of energy given off in Step 2 is equal to the amount of energy used in Step 1: Mother Nature is very energy efficient.

Improving on Mother Nature's Desalination

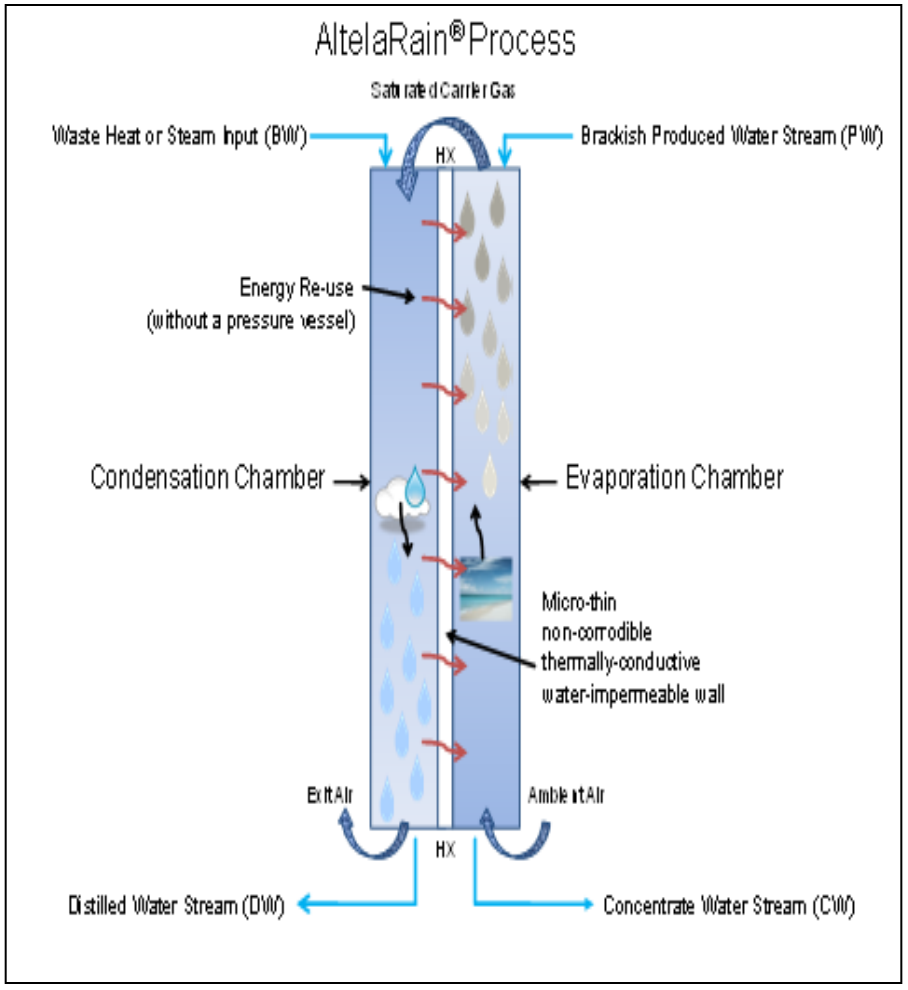
Altela has developed a new commercial water desalination process that mimics Mother Nature, but improves on her too:

- AltelaRain® brings Steps 1 and 2 together just 200 microns (0.008") apart, rather than thousands of miles apart
- So the energy given back in the condensation step is used over and over again in the evaporation step:
- Reducing the amount of even this low-grade inexpensive heat to only one-third of what it is for conventional thermal distillation
- That is, Altela desalinates 3 gallons of water for the energy to evaporate 1 gallon conventionally
- Since Altela uses no pressure, all components are made with inexpensive plastics, rather than metals that corrode

Altela Distilled Water Treatment Process

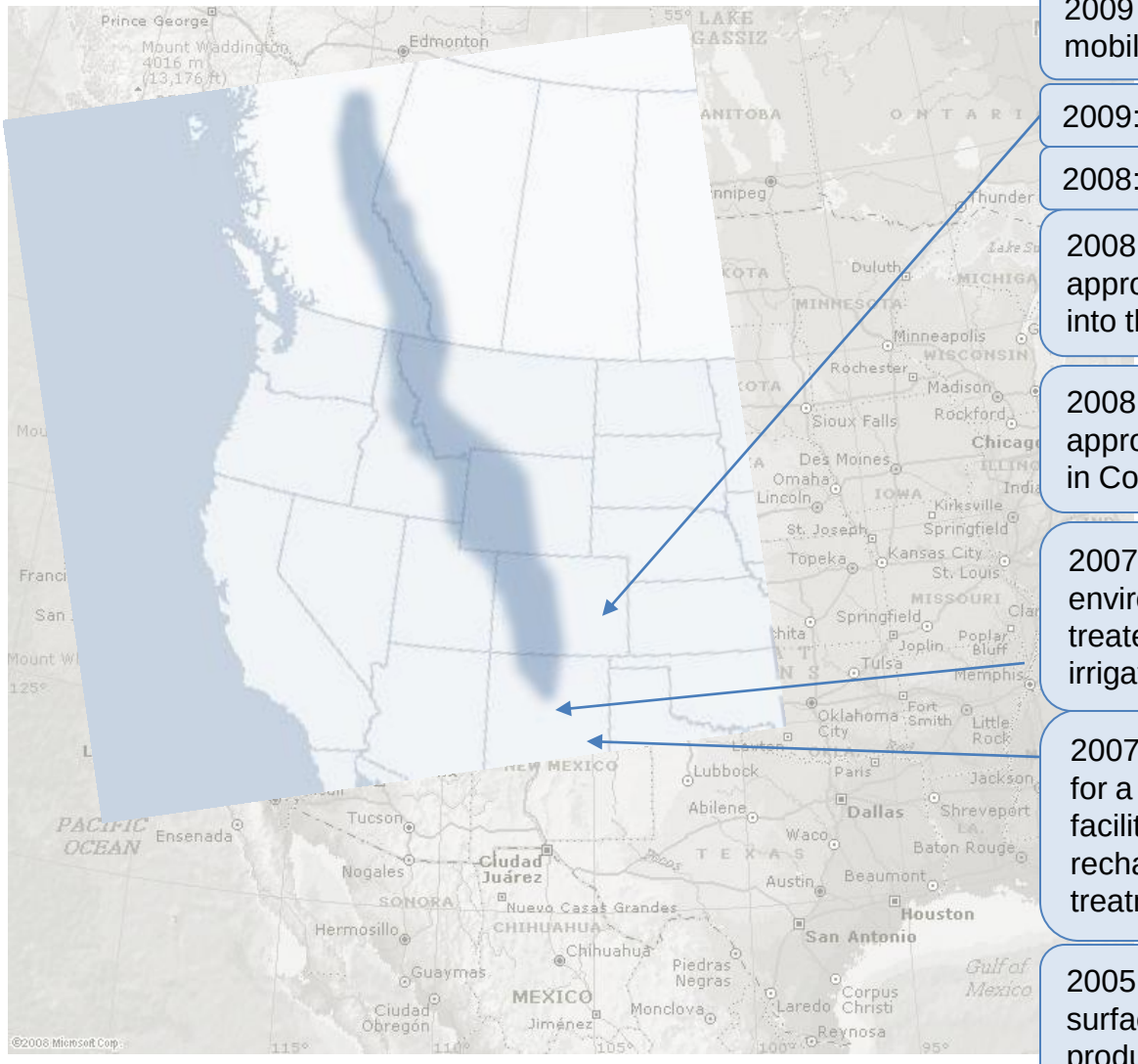
AltelaRain® Process - Significant key advantages:

- Is NOT an 'evaporator'
- Extremely high quality of treated water; unique desal process removes ALL salt
- Low cost (both capital and operating cost)
- Ambient pressure operation – safe
- Near-ambient temperature operation
- High thermal efficiency
- All plastic construction
- Only desal process NOT driven by electricity
- No fouling/scaling; no membranes to replace
- Can employ low-grade waste-heat to operate, e.g., land-fill gas or compressors



Altela, Inc. Manufacturing Facility

Altela Precedent-Setting Permits



2009 & 2010: Marcellus PA DEP Approvals: mobile & stationary AltelaRain® Systems

2009: CO General Permit issued for re-use

2008: AltelaRain® Pilot Permit in Canada

2008: Precedent-setting U.S. EPA-based approval to discharge treated, clean PW into the Colorado River Basin

2008: First-ever non-tributary water right approval for beneficial use of treated, PW in Colorado within the Colorado River Basin

2007: First-ever Navajo Nation environmental permit to surface discharge treated, purified produced water for irrigation, livestock, and agricultural re-use

2007: First-ever US EPA-based approval for a centralized produced water treatment facility for in-stream flow and aquifer recharge through a publicly owned treatment works (POTW)

2005: First-ever approval in New Mexico to surface discharge treated, purified produced water for re-use

US Department of Energy's National Technology Laboratory ("NETL") Conclusion

- The operation passed PA DEP regulations (Chapter 95 discharge standards)
- Proved it can be placed at the wellhead and operated within PA DEP regulatory frameworks
- Water quality met or exceeded all requisite PA DEP water quality discharge requirements
- The price per barrel of treated water was less than conventional trucking and disposal
- Accelerated commercialization of the technology increases technology transfer

Altela, Inc. Mobile Systems

Summary of Innovative New Technology Attributes

- New low-cost technologies for frac-flowback and produced water treatment in the Marcellus/Utica
- Desalination: the key to giving producers reproducible certified recycled frac water that's the same every day
- One-stop shop facilities provide any combination of water disposal, water storage, and certified frac water sales to each customer's particular TDS specification
- Multiple small facilities reduce trucking distances; no UIC injection
- Low-cost desalination uses only inexpensive plastic – no membranes, expensive metals, fouling, or corrosion
- New process driven by low-grade heat, waste energy, or natural gas – not expensive electricity

Once you understand what we do, you'll see where we can go.